

Notice of Allowability

Application No.

10/047,459

Examiner

Wesley D. Markham

Applicant(s)

HIROYUKI ET AL.

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment of 1/14/2005 and the attached examiner's amendment.
2. ☒ The allowed claim(s) is/are 1,3,6,11-15,18 and 19.
3. ☒ The drawings filed on 14 January 2005 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☒ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date attached.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

WDM 



EXAMINER'S AMENDMENT / ALLOWANCE

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Surinder Sachar on 4/1/2005.

The application has been amended as follows:

In the claims:

Claims 7 and 16 have been canceled.

In Claim 18, line 11, the phrase, "wherein a_0 , a_1 , a_2 , and a_3 are constant coefficients;" has been amended to read, "--wherein a_0 , a_1 , a_2 , a_3 , and a_4 are constant coefficients;--".

In Claim 19, line 6, the word "wherein" has been deleted before the phrase "using said model to select..."

Allowable Subject Matter

Claims 1, 3, 6, 11 – 15, 18, and 19 are allowed.

To begin, the examiner notes that the oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date, or an acceptable application data sheet (ADS), is required. See MPEP §§ 602.01 and 602.02. The oath or declaration is defective because it does not identify the mailing / post office address of each inventor. A mailing address is an address at which an inventor customarily receives his or her mail and may be either a home or business address. The mailing address should include the ZIP Code designation. The mailing address may be provided in an application data sheet or a supplemental oath or declaration. See 37 CFR 1.63(c) and 37 CFR 1.76. In the response filed on 1/14/2005, the applicant indicated that an ADS was submitted, but no ADS was received by the Office. Additionally, the examiner notes that the formal drawings filed by the applicant on 1/14/2005 (3 sheets, 4 figures) are acceptable, and the objections to the drawings and specification set forth in paragraphs 4 – 6 of the previous Office Action are withdrawn in light of the applicant's amendment to correct the informalities noted by the examiner.

The following is an examiner's statement of reasons for allowance: The claimed invention is drawn to a method for manufacturing an optical filter. The deposition of a desired thickness of the layer(s) of the filter is achieved by using an equation / model / "defined functional relationship" to select a deposition stopping time during film formation (i.e., the "defined functional relationship" is used to predict the stopping time during the depositing of the material). Independent Claims 1, 6, 15, and 18 all require that the "predicting" comprise measuring an optical property of the deposited material at

Art Unit: 1762

a plurality of times after the start of material deposition, and comparing the measurements to values predicted by the "defined functional relationship" between the optical property and time of deposition, wherein the functional relationship defines transmittance $f(t)$ as a function of time, and is defined as

$$f(t) = [1 / (a_0 + a_1 \cos(a_2 t + a_3))] + a_4$$

wherein a_0 , a_1 , a_2 , a_3 , and a_4 are constant coefficients. Independent Claim 11 requires measuring an optical characteristic of the filter at selected points in time by irradiating the film with light, calculating a theoretical value of the optical characteristic utilizing a theoretical formula comprising at least one empirically adjustable constant parameter, compensating the at least one constant parameter to provide an adjusted parameter so that the difference between the theoretical value and the measured value of the optical characteristic is minimized, predicting the optimal film formation time with the adjusted parameter, and stopping the formation at the optimal time. Independent Claim 19 requires modeling an optical characteristic of the film with an equation relating the optical characteristic to deposition time, the equation having a functional form that is theoretically valid at substantially all times during film deposition, and using the model to select a deposition stopping time during film formation, wherein using the model (to select / predict the deposition stopping time during film formation) comprises adjusting one or more constant terms in the equation so as to minimize differences between measured values of the optical characteristic and values of the optical characteristic calculated with the equation. A summary of the closest prior art of record follows.

Mitsuhashi et al. (USPN 6,490,497 B1), Chen et al. (US 2003/0003605 A1), Yu et al.

Art Unit: 1762

(USPN 5,131,752), Takahashi et al. (USPN 6,481,369 B1), and Berthold (USPN 3,637,294) all teach various methods of controlling the thickness of a thin film (e.g., for use in an optical filter) being either deposited or etched (i.e., determining the end-point of a deposition or etching process). However, none of the aforementioned references teaches using a predictive model to do so (i.e., using an equation / model / "defined functional relationship" to select a deposition stopping time during film formation; i.e., the "defined functional relationship" is used to predict the stopping time during the depositing of the material). Southwell et al. (USPN 5,425,964) teaches a method for manufacturing an optical filter, the method comprising depositing a material on a substrate, interpolating (i.e., "predicting") a deposition stop time during the depositing of the material but prior to reaching the predicted stop time (i.e., the "QuitTime"), and stopping deposition substantially at the predicted stop time. Kawahara et al. (USPN 5,151,295) teaches a method for manufacturing an optical recording medium having layer(s) whose thickness is optimized to make use of optical interference effects (i.e., an "optical filter"), the method comprising depositing a material on a substrate, predicting a deposition stop time (i.e., time " t_1 ") during the depositing of the material but prior to reaching the predicted stop time, and stopping deposition substantially at the predicted stop time. Maung et al. (USPN 5,503,707) teaches a method for manufacturing a multilayer film on a substrate, the method comprising depositing a material on a substrate, predicting a deposition stop time during the depositing of the material but prior to reaching the predicted stop time, and stopping deposition substantially at the predicted stop time. However, the prior art of record, alone or in combination, does not

Art Unit: 1762

teach or reasonably suggest the following aspects of the claimed invention in conjunction with a method of manufacturing an optical filter by predicting / selecting a deposition stop time (e.g., a time when the desired film thickness will be reached) during the filter forming / deposition process: (1) Using the specifically claimed formula that defines transmittance as a function of time to predict the stop time / determine when the deposition will be complete (Claims 1, 3, 6, 15; and 18), (2) predicting the optimal time of forming the film using an adjusted constant parameter that is obtained by measuring an optical characteristic of the filter at selected points in time by irradiating the film with light, calculating a theoretical value of the optical characteristic using a theoretical formula comprising an adjustable constant parameter, and compensating the adjustable parameter to minimize the difference between the theoretical value and the measured value of the optical characteristic (Claims 11 – 14), and (3) using a model that is theoretically valid at substantially all times during film deposition to select a deposition stopping time during film formation by adjusting one or more constant terms in an equation relating an optical characteristic to deposition time so that the differences between measured and calculated values of the optical characteristic are minimized (Claim 19).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Art Unit: 1762

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D. Markham whose telephone number is (571) 272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

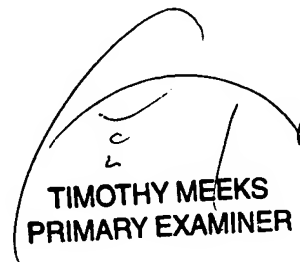
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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Art Unit 1762



TIMOTHY MEEKS
PRIMARY EXAMINER